AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1-19. (Canceled)

20. (Previously presented) The method of claim 27, wherein said sensor elements are beads and said array comprises subpopulations of beads dispersed on a substrate.

21. (Original) The method of claim 20 wherein said substrate is a fiber optic bundle.

22. (Original) The method of claim 20 further comprising identifying the location of each sensor element within each sensor subpopulation within the array.

23-26. (Canceled)

27. (Currently amended) A method of statistically analyzing response signals obtained from a sensor element array to determine the statistical validity of said response signals, said method comprising:

a) providing an array comprising a population of sensor elements at a density of least 20,000 sensor elements per 1 mm^2, said population of sensor elements comprising ~~with~~ a plurality of subpopulations of sensor elements, the plurality of subpopulations of sensor elements comprising a first subpopulation comprising sensor elements having the same first bioactive agent and a second subpopulation comprising sensor elements having the same second bioactive agent;

b) contacting said array with a composition comprising at least a target analyte, thereby producing a response signal at said sensor elements of at least one of said first and second subpopulations;

c) obtaining individual response signals ~~at each of said~~ from 5 to 100 separate sensor elements from at least one of said first and second subpopulations; and

d) performing a statistical analysis on said response signals from at least one of said first and second subpopulations, whereby statistical validity of said response signals is determined.

28. (Canceled)

29. (Previously presented) The method according to claim 27, wherein at least one of said bioactive agents is a nucleic acid.

30. (Previously presented) The method according to claim 27, wherein at least one of said bioactive agents is a protein.

31. (Previously presented) The method according to claim 20, further comprising determining outlying beads and excluding outlying beads from said subpopulation.

32. (Previously presented) The method according to claim 27, wherein said statistical analysis comprises calculating the mean of at least said response signals from said first of said plurality of subpopulations.

33. (Previously presented) The method according to claim 27, wherein said statistical analysis comprises calculating the standard deviation of at least said response signals from said first of said plurality of subpopulations.

34. (Previously presented) The method according to claim 27, further comprising evaluating the statistical validity of said response signals.

35. (Previously presented) The method according to claim 27, further comprising performing a second statistical analysis on said response signals.

36. (Previously presented) The method according to claim 35 wherein said second statistical analysis comprises evaluating said measurements using confidence intervals.

37. (Previously presented) The method according claim 35, wherein said second statistical analysis comprises using said response signals to perform hypothesis testing.

38. (Previously presented) The method according to claim 27, further comprising comparing said statistical analysis of response signals obtained from at least two subpopulations.

39. (Previously presented) The method according to claim 38, wherein said statistical analysis comprises performing a cluster analysis of response signals from each of said subpopulations.

40-46. (Canceled)

47. (Previously presented) The method according to claim 20, wherein said substrate is selected from the group consisting of glass and plastic.

48. (Canceled)

49. (New) The method according to claim 27, wherein individual response signals from 5 to 20 separate response elements are obtained.

50. (New) The method according to claim 27, wherein individual response signals from roughly 10 separate response elements are obtained.

51. (New) The method according to claim 27, wherein individual response signals from 10 separate response elements are obtained.

52. (New) The method according to claim 29, wherein said nucleic acid is 25 nucleobases in length.

53. (New) The method according to claim 27, wherein said sensor elements are attached to a planar substrate.

54. (New) The method according to claim 53, wherein said composition does not flow-through said substrate.

55. (New) The method according to claim 53, wherein said sensor elements are arranged in a regular pattern addressable in the X-Y coordinate plane.

56. (New) The method according to claim 53, wherein said sensor elements are randomly distributed on said planar substrate.

57. (New) The method according to claim 53, wherein said planar substrate is selected from the group consisting of glass and plastic

58. (New) The method according to claim 53, wherein said planar substrate is approximately the dimensions of a microscope slide cover slip.

59. (New) The method according to claim 27, wherein said target analyte is present in solution.

60. (New) The method according to claim 59, wherein said solution is applied directly to said sensor elements.

61. (New) The method according to claim 60, wherein said sensor elements are immersed in said solution.

62. (New) The method according to claim 61, wherein said sensor elements are immersed in said solution by dipping the sensor elements in said solution.

63. (New) The method according to claim 29, wherein said nucleic acids comprise nucleic acid pairs, said nucleic acid pairs having the same sequence at all but one nucleotide position.

64. (New) A method of statistically analyzing response signals obtained from a sensor element array to determine the statistical validity of said response signals, said method comprising:

a) providing an array comprising a surface having a plurality of subpopulations of sensor elements attached thereto, the plurality of subpopulations of sensor elements comprising a first subpopulation comprising sensor elements having identical first nucleic acids and a second subpopulation comprising sensor elements having identical second nucleic acids;

b) immersing the surface of said array with a solution comprising a target analyte, thereby producing a response signal at said sensor elements of at least one of said first and second subpopulations;

c) obtaining individual response signals from at least 5 separate sensor elements from at least one of said first and second subpopulations; and

d) performing a statistical analysis on said response signals from at least one of said first and second subpopulations, whereby statistical validity of said response signals is determined.

65. (New) The method according to claim 64, wherein individual response signals from 5 to 20 separate response elements are obtained.

66. (New) The method according to claim 64, wherein individual response signals from roughly 10 separate response elements are obtained.

67. (New) The method according to claim 64, wherein individual response signals from 10 separate response elements are obtained.

68. (New) The method according to claim 64, wherein said nucleic acid comprises DNA.

69. (New) The method according to claim 68, wherein said DNA is 25 nucleobases in length.

70. (New) The method according to claim 64, wherein said nucleic acids comprise nucleic acid pairs, said nucleic acid pairs having the same sequence at all but one nucleotide position.

71. (New) The method according to claim 64, wherein said sensor elements are arranged in a regular pattern addressable in the X-Y coordinate plane.

72. (New) The method according to claim 64, wherein said sensor elements are randomly distributed on said surface.

73. (New) The method according to claim 64, wherein said statistical analysis comprises calculating the mean of at least said response signals from said first of said plurality of subpopulations.

74. (New) The method according to claim 64, wherein said statistical analysis comprises calculating the standard deviation of at least said response signals from said first of said plurality of subpopulations.

75. (New) The method according to claim 64 further comprising evaluating the statistical validity of said response signals.

76. (New) The method according to claim 64 further comprising performing a second statistical analysis on said response signals.

77. (New) The method according to claim 76, wherein said second statistical analysis comprises evaluating said measurements using confidence intervals.

78. (New) The method according claim 76, wherein said second statistical analysis comprises using said response signals to perform hypothesis testing.

79. (New) The method according to claim 64 further comprising comparing said statistical analysis of response signals obtained from at least two subpopulations.

80. (New) The method according to claim 79, wherein said statistical analysis comprises performing a cluster analysis of response signals from each of said subpopulations.

81. (New) The method according to claim 64, wherein immersing the surface of said array comprises dipping said array into said solution.